

We may now return to consider the effect of the examinations of the University of London upon the teaching of Physics. These examinations, as we have seen, exist for the express purpose of encouraging the pursuit of "a regular and liberal course of education," or, as it may be otherwise expressed, in order to encourage good teaching and to discourage bad; and in the foregoing remarks I have tried to show as definitely as I can what meaning is to be attached to the words "good" and "bad" in relation to the teaching of Physics. The obvious conclusion, applicable to the particular point to which I now wish to ask your attention, is that examinations are to be regarded as *good* if they induce candidates to think about the mutual relations of individual facts and their connection with general principles; while examinations are *bad* in proportion as they lead to the loading of the memory with unconnected scraps of knowledge.

There are two ways in which the examinations of the University of London tend to affect the quality of teaching for good or for evil: first, by the general Regulations drawn up by the Senate in reference to the various examinations, including the list of subjects to be taken up and the specifications of the requirements in each subject; and secondly, the questions set by the Examiners, which form as it were a detailed commentary, authorised by the Senate, on the meaning of their own Regulations. For various reasons, the lowest examinations, or those which come earliest in the University scheme, produce the greatest effect on methods of teaching and learning; for one thing, they affect the greatest number of candidates, and they come at a part of the candidates' career when they are most dependent on external authority or advice as to the course of their studies.

#### THE BIBLIOGRAPHY OF SCIENCE

THERE can be no surer indication of the universal spread of science during the last few years than the large and annually increasing number of works relating to its various branches that are advertised for publication during each successive season. The considerable element which science now forms in education, in the arts and manufactures, in commerce and agriculture, and in the social economy of life, renders the knowledge of at least its rudiments absolutely necessary in almost every sphere of existence. The particulars given below will show that publishers are fully alive to the importance and value of good works in this department of literature.

Although even now we have a large quantity of educational books of varying degrees of mediocrity and excellence in almost all the commoner branches of science, and the number of works is ever increasing, yet the advance made by science makes it imperative that fresh manuals and class-books and new editions should be continually published, in order that students and workers should be enabled to keep pace with its rapid strides. The works we notice beneath range from the smallest general primer to the most elaborated and matured works in particular and specific branches of science; and among them will be found books by men of the highest reputation in their special provinces. We have endeavoured to notice every work of importance which is to be published during the next few months; but our list is necessarily incomplete; we shall, however, in future numbers note any deficiencies, omissions, or fresh announcements.

In ASTRONOMY we observe the following books:—*The Moon*, and the Condition and Configuration of its Surface, by Edmund Neison, Fellow of the Royal Astronomical Society, &c., illustrated by maps and plates. (Longmans.)—*A Primer of Astronomy*, by J. Norman Lockyer, F.R.S., with illustrations. (Macmillan.)—A new edition of *Navigation and Nautical Astronomy*, in

theory and practice, by Prof. J. R. Young. (Lockwood.)—*The Transits of Venus*, a Popular Account of Past and Coming Transits, from the first observed by Horrocks, A.D. 1639, to the Transit of A.D. 2112, by Richard Anthony Proctor, B.A. Cantab., Hon. Fell. King's Coll. Lond., with twenty plates and numerous woodcut illustrations. (Longmans.)

In CHEMISTRY we are promised a new edition of Dr. Normandy's *Commercial Handbook of Chemical Analysis*, enlarged and almost re-written by Dr. H. M. Noad, Ph.D., F.R.S. &c., with numerous illustrations. (Lockwood).—A second edition of *Plattner's Manual of Qualitative and Quantitative Analysis with the Blowpipe*, from the last German edition, revised and enlarged by Prof. Th. Richter, of the Royal Saxon Mining Academy, translated by Prof. H. B. Cornwall, Assistant in the Columbia School of Mines, New York; this work is illustrated with eighty-seven woodcuts and one lithographic plate. (Sampson Low.)—*Industrial Chemistry*, a Manual for Manufacturers and for use in Colleges or Technical Schools, being a translation by Dr. J. D. Barry, of Professors Stohmann and Engler's German edition of Payen's "Précis de Chimie Industrielle"; edited throughout and supplemented with chapters on the Chemistry of the Metals, by B. H. Paul, Ph.D., with very numerous plates and woodcuts. (Longmans.)—A third enlarged edition of *A Systematic Handbook of Volumetric Analysis*, or the Quantitative Estimation of Chemical Substances by Measure, applied to Liquids, Solids, and Gases, with numerous engravings, by Francis Sutton, F.C.S., Norwich. (Churchill.)—*The Chemical Effects of Light and Photography, in their Application to Art, Science, and Industry*, by Dr. Hermann Vogel. (King and Co.)—A new edition, revised and enlarged, of *Practical Metallurgy*, by John Percy, M.D., F.R.S., Lecturer on Metallurgy at the Government School of Mines. Vol. I., Part 1. Introduction; Fuel, wood, peat, coal, charcoal, coke, refractory materials, fire-clays, &c. Vol. I., Part 2. Copper, zinc, brass. (John Murray.)

In PHYSICS and MECHANICS, Messrs. Longmans will publish the three following books:—*The Elements of Physics*, by Neil Arnott, M.D., F.R.S., the seventh edition, revised from the author's notes and other sources, and edited by Alexander Bain, LL.D., Professor of Logic in the University of Aberdeen, and by Alfred Swaine Taylor, M.D., F.R.S., Professor of Medical Jurisprudence, Guy's Hospital.—*Introduction to Experimental Physics, Theoretical and Practical*, including directions for constructing physical apparatus and for making experiments, by Adolf F. Weinhold, Professor in the Royal Technical School at Chemnitz, translated and edited (with the author's sanction) by Benjamin Loewy, F.R.A.S., with a preface by G. C. Foster, F.R.S., Professor of Physics in University College, London, with numerous wood engravings.—*Lessons in Elementary Mechanics*, introductory to the Study of Physical Science, by Philip Magnus, B.Sc., B.A. This book is adapted to the requirements of the London Matriculation, Preliminary, Scientific, First M.B., and other Examinations.

Messrs. Charles Griffin will issue *A Mechanical Text-Book*, a Practical and Simple Introduction to the Study of Mechanics, by William John Macquorn Rankine, C.E., LL.D., F.R.S.S., &c., late Regius Professor of Civil Engineering in the University of Glasgow; and Edward Fisher Bamber, C.E.

In BIOLOGY we have a large number of new books and new editions, of which the following are the most noteworthy:—*The History of Creation*, by Prof. Ernst Haeckel, the translation revised by E. Ray Lankester, M.A. (King and Co.)—*Elements of Human Physiology*, by Dr. L. Hermann, Professor of Physiology in the University of Zurich, translated and edited from the sixth (yet unpublished) German edition, at the author's request, by Arthur Gamgee, M.D., F.R.S., Brackenbury

Professor of Practical Physiology and Histology in the Owens College, Manchester. (Smith, Elder, and Co.)—*Outlines of Animal Physiology*, with engravings on wood, by W. H. Allchin, M.B., M.R.C.P., Assistant Physician to the Westminster Hospital and Lecturer on Practical Physiology, Histology, and Pathology in its Medical School. (Churchill.)—*Notes of Demonstrations on Physiological Chemistry*, by S. W. Moore, F.C.S., Joint Demonstrator of Practical Physiology at St. George's Medical School. (Smith, Elder, and Co.) This work is nearly ready for publication.—The same publishers announce *The Pathological Anatomy of the Nervous Centres*, by Edward Long Fox, M.D., F.R.C.P., Physician to the Bristol Royal Infirmary, with illustrations; and a *Text-Book of Pathological Anatomy*, by John Wyllie, M.D., F.R.C.P.E., Lecturer on General Pathology at the School of Medicine, Surgeons' Hall, Edinburgh, &c.

We are glad to see that Messrs. Churchill have in the press a fifth and revised edition of Holden's well-known work on *Human Osteology*, comprising a Description of the Bones, with Delineations of the Attachments of the Muscles, &c.—The three following new works also belong to the same publishers:—*Frey's Manual of the Histology and Histo-Chemistry of Man*, a Treatise on the Elements of Structure and Composition of the Human Body, for the use of Practitioners and Students, largely illustrated with engravings on wood, translated by Arthur E. J. Barker, I.R.C.S.I., and revised by the author.—*The Student's Guide to Human Osteology*, with numerous lithographic plates, by William Warwick Wagstaffe, F.R.C.S., Assistant Surgeon and Lecturer on Anatomy at St. Thomas's Hospital.—*The Student's Guide to Practical Histology, Histo-Chemistry, and Embryology*, with engravings on wood; by H. A. Reeves, F.R.C.S. Edin., Assistant Surgeon and Demonstrator of Anatomy at the London Hospital.

The only other book we notice in this branch of science is a new edition of *Demonstrations of Anatomy*, being a Guide to the Knowledge of the Human Body by Dissection, by George Viner Ellis, Professor of Anatomy in University College, London, with 248 engravings on wood. The number of illustrations has been largely added to in this edition, and many of the new woodcuts are reduced copies of the plates in the author's work, "Illustrations of Dissections." (Smith, Elder, and Co.)

In GEOGRAPHY and TRAVELS, probably the works most looked for are *The Last Journals of Dr. Livingstone, in Eastern Africa, from 1865 to his Death*, continued by a narrative of his last moments and sufferings, taken down from the mouth of his faithful servants Chuma and Susi, edited by Rev. Horace Waller, F.R.G.S., Rector of Twywell, Northampton, with a map prepared on the spot by the author, and illustrations from his sketches. (Murray); and Sir Samuel Baker's new book, which is entitled *Ismailia*, a Narrative of the Expedition to Central Africa for the Suppression of the Slave Trade, organised by Ismail, Khedive of Egypt, with maps, portraits, and upwards of fifty full-page illustrations by Zwecker and Durand (Macmillan).

Messrs. Sampson Low, as usual, are to the fore in books of travels. We give the titles and some particulars of seven of them:—*Turkistan, Notes of a Journey in the Russian Provinces of Central Asia and the Khanates of Bokhara and Kokand*, by Eugene Schuyler, Secretary of American Legation, St. Petersburg. This book will be profusely illustrated.—*The Straits of Malacca, Indo-China, and China, or Ten Years' Travels, Adventures, and Residence Abroad*, with upwards of sixty woodcuts from the author's own photographs and sketches, by J. Thompson, F.R.G.S., author of "Illustrations of China and its People." This work contains a narrative of the writer's personal experience and adventures in the Straits of Malacca, Siam, Cambodia, Cochinchina, and China, illustrated with over sixty wood engravings from

the author's sketches and photographs. A long residence in the Straits of Malacca enabled the author to visit some of the native states, and to give an account of our important colonial possessions in that quarter of the globe, as also of his personal intercourse with the native Malay rulers, and his estimate of the value of the Chinaman and of Chinese labour in a tropical region.—*The Second North German Polar Expedition in the years 1869–70*, of the ships *Germania* and *Hansa*, under command of Capt. Koldeway, edited and condensed by H. W. Bates, Esq., of the Royal Geographical Society, and translated by Louis Mercier, M.A. (Oxon.) The narrative portion of this important work will be full of interest and adventure in the ice-fields; and, in addition to much matter of great scientific value, will give a graphic account of the hardships and sufferings of the crew of the *Hansa* after the crushing of that ship in the ice.—*Warburton's Journey across Australia*, an account of the Exploring Expedition sent out by Messrs. Elder and Hughes, under the command of Colonel Egerton Warburton, giving a full account of his perilous journey from the centre to Roebourne, Western Australia, with illustrations and a map, edited, with an Introductory Chapter, by H. W. Bates, Esq., of the Royal Geographical Society.—*Captain Tyson's Arctic Adventures; Arctic Experiences*, containing Captain George E. Tyson's Wonderful Drift on the Ice-Floe, a history of the *Polaris* Expedition, the cruise of the *Tigress*, and Rescue of the *Polaris* Survivors, to which is added a General Arctic Chronology, edited by E. Vale Blake, with a map and numerous illustrations.—*The Marvellous Country, or Three Years in Arizona and New Mexico*, by Samuel W. Cozzens, illustrated.—*The Earth as Modified by Human Action*, by George P. Marsh, being a new edition of "Man and Nature."

Mr. Murray announces *Six Months among the Palm Groves, Coral Reefs, and Volcanoes of the Sandwich Islands*, by Isabella Bird, author of "The Englishwoman in America," with illustrations.

Messrs. Trübner have nearly ready *A Peep at Mexico*, Narrative of a Journey across the Republic from the Pacific to the Gulf, in December 1873, and January 1874, by J. L. Geiger, F.R.G.S., with four maps and forty-five original photographs.

In MEDICINE, &c., the announcements are very numerous; we give the more important. Messrs. Longmans have in the press *A Dictionary of Medicine*, edited by Richard Quain, M.D., F.R.S., assisted by numerous eminent writers.

Messrs. Charles Griffin will publish very shortly *Outlines of the Science and Practice of Medicine*, a Handbook for Students, by William Aitken, M.D., F.R.S.

From Messrs. Churchill we receive notice of the following forthcoming books among a long list of others, viz.:—*Air, Water, and Sewage, a Manual of Analysis for Medical Officers of Health, &c.*, by Francis Sutton, F.G.S., and William Thorp, B.Sc., F.C.S.—*A Handy-Book of Forensic Medicine and Toxicology*, with numerous wood engravings, by W. Bathurst Woodman, M.D. St. And., Assistant Physician and Lecturer on Physiology at the London Hospital, &c., and C. Meymott Tidy, M.A., M.B., Medical Officer of Health and Food Analyst for Islington.—*Experimental Investigation of the Action of Medicines*, a Handbook of Practical Pharmacology, with engravings, by T. Lauder Brunton, M.D., D.Sc., Lecturer on *Materia Medica* in the Medical College of St. Bartholomew's Hospital.—*The Diseases of Tropical Climates and their Treatment*, with Hints for the Preservation of Health in the Tropics, by J. A. B. Horton, M.D. Edin., F.R.G.S., Staff-Assistant-Surgeon of the Army Medical Department.—*The Face, Mouth, and Throat, the Surgical Treatment of their Diseases, Injuries, and Deformities*, with engravings on wood, by Francis Mason, F.R.C.S., Senior Assistant Sur-

geon and Lecturer on Anatomy at St. Thomas's Hospital.—*The Student's Guide to the Diseases of the Eye*, with engravings, by Henry Power, M.B., F.R.C.S., Senior Ophthalmic Surgeon to St. Bartholomew's Hospital.—*Report on the Issue of a Spirit Ration during the March to Coomassie*, by E. A. Parkes, M.D., F.R.S., Member of the General Medical Council.—*The Student's Guide to the Practice of Midwifery*, with engravings, by D. Lloyd Roberts, M.D., Vice-President of the Obstetrical Society of London, Physician to St. Mary's Hospital, Manchester.—*Clinical Studies of Disease in Children*, by Eustace Smith, M.D., F.R.C.P., Physician to the King of the Belgians, Physician to the East London Hospital for Children.

Messrs. Charles Griffin have nearly ready *A Dictionary of Hygiene and Public Health* (with illustrations), comprising Sanitary Chemistry, Engineering, and Legislation, the Dietetic Value of Foods, and the Detection of Adulterations, based on the "Dictionnaire d'Hygiène Publique" of Prof. Ambroise Tardieu, by Alexander Wynter Blyth, M.R.C.S., L.S.A., A.R.C., Medical Officer of Health, and Analyst to the County of Devon.

Messrs. Smith, Elder, and Co. also promise us a work *On the Curative Effects of Baths and Waters*, being a Handbook to the Spas of Europe, by Dr. J. Braun, with a Sketch on the Balneotherapeutic and Climatic Treatment of Pulmonary Consumption, by Dr. L. Rohden, an abridged translation from the third German edition, with Notes, by Hermann Weber, M.D., F.R.C.P., London Physician to the German Hospital.

The following BOTANICAL BOOKS are advertised as coming out this season:—*Medicinal Plants*, by Robert Bentley, F.L.S., Professor of Botany in King's College, London, and Henry Trimen, M.B., F.L.S., of the British Museum, and Lecturer on Botany at St. Mary's Hospital Medical School. This work will include full botanical descriptions and an account of the properties and uses of the principal plants employed in medicine, especial attention being paid to those which are officinal in the British and United States Pharmacopœias. The plants which supply food and substances required by the sick and convalescent will be also included. Each species will be illustrated by a coloured plate drawn from nature. This will be published in monthly parts, and Part I. will be ready very soon (Churchill).—*Pharmacographia*, a History of the Principal Drugs of Vegetable Origin found in Commerce in Great Britain and British India, by F. A. Flückiger and D. Hanbury, F.R.S. (Macmillan).—*The Primæval World of Switzerland*, by Prof. Oswald Heer, of the University of Zurich, translated by W. S. Dallas, F.L.S., and edited by James Heywood, M.A., F.R.S., with numerous illustrations. (Longmans.)

In the Sciences of GEOLOGY and MINERALOGY, &c., we are promised *Geology, for Students and General Readers*, embodying the most Recent Theories and Discoveries, by A. H. Green, M.A., Professor of Geology and Mining in the Yorkshire College of Science. Part I. The Elements of Physical Geology, with upwards of 100 illustrations by the author. Part II. The Elements of Stratigraphical Geology, with upwards of 100 illustrations by the author. (Daldy, Ibister, & Co.) The same publishers also have *Geological Climate and Time*, a Theory of Secular Changes of the Earth's Climate, by James Croll, of H.M. Geological Survey; *A Treatise on Mining*, by Lottner and Serlo, of the Berlin Academy of Mining, translated from the German by Prof. Le Neve Foster and Mr. Galloway, with 268 illustrations and diagrams; and *The Creation*, or Dynamical System of the Earth's Formation, in accordance with the Mosaic Record and the latest Discoveries of Science, by Archibald T. Ritchie.—*The Origin of Creation*, or the Science of Matter and Force, a New System of Natural Philosophy, by Thomas Roderick Fraser, M.D., and Andrew Dewar. (Longmans).—*The*

*Dawn of Life upon the Earth*, by J. W. Dawson, LL.D., F.R.S., F.G.S., Principal and Vice-Chancellor of McGill University, Montreal, with illustrations. (Hodder and Stoughton.)

Finally, among MISCELLANEOUS BOOKS the following will probably interest the majority of our readers:—A new edition is nearly ready of *The Origin of Civilisation and the Primitive Condition of Man*, Mental and Social Condition of Savages, by Sir John Lubbock, Bart., M.P., F.R.S. (Longmans).—*Outlines of Cosmic Philosophy, based on the Doctrine of Evolution, with Criticisms on the Positive Philosophy*, by John Fiske, M.A., LL.B., formerly Lecturer on Philosophy at Harvard University. (Macmillan).—*On the Sensations of Tone*, as a Physiological Basis for the Theory of Music, by Prof. H. Helmholtz, translated (with the author's sanction) from the third German edition by Alexander J. Ellis, F.R.S., F.S.A. (Longmans).—*Out of Doors*, a selection of original articles on Practical Natural History, by the Rev. J. G. Wood, M.A., F.L.S., author of "Homes without Hands," &c., with six illustrations, from original designs engraved on wood by G. Pearson. (Longmans).—*Insects Abroad*, being a popular account of foreign insects, their structure, habits, and transformations, by the Rev. J. G. Wood, M.A., F.L.S., illustrated with 600 figures by E. A. Smith and J. B. Zwecker. (Longmans).—*The Aërial World*, by Dr. George Hartwig. (Longmans).—*Memoir of Sir Roderick Murchison*, including extracts from his journals and letters, with notices of his scientific contemporaries, and a sketch of the rise and progress, for half a century, of Palæozoic Geology in Britain, by Archibald Geikie, LL.D., F.R.S., Murchison Professor of Geology and Mineralogy in the University of Edinburgh, and Director of the Geological Survey of Scotland. (Murray).—*The Physics and Philosophy of the Senses*, or the Mental and the Physical in their Mutual Relations, by R. S. Wyld, F.R.S.E., illustrated. (King and Co.).—*The Elements of the Psychology of Cognition*, by Robert Jardine, B.D., D.Sc., Principal of the General Assembly College, Calcutta. (Macmillan).—*On Parasites in the Animal Kingdom*, by M. Van Beneden. (King and Co.).—*The Doctrine of Descent and Darwinism*, by Prof. Oscar Schmidt. (King and Co.).—*Optics*, by Prof. Lommel, profusely illustrated. (King and Co.).—*Fungi*, their Nature, Influences, and Uses, by the Rev. M. J. Berkeley and Dr. M. Cooke, profusely illustrated. (King and Co.).—*Scientific London*, an account of the History and present scope of the principal Scientific Societies and Institutions of London, by Bernard H. Becker. (King and Co.)

#### THE NEW REPTILE-HOUSE IN THE JARDIN DES PLANTES

THE new house for Reptiles and Batrachians in the Jardin des Plantes at Paris was opened to the public last week. It contains four divisions: two larger central, and two smaller end compartments, all connected by folding doors. The front larger compartment is fitted up in the middle with large shallow tanks for the Crocodilia, of which there are five examples of *Crocodilus vulgaris*, *C. frontatus*, *Alligator mississippiensis*, and two species of Jacare. In front is a row of glass cages for Snakes—Boas, Pythons, and various Colubrines. The second larger compartment is devoted chiefly to Batrachians, and contains various Salamanders (*Triton*, &c.), and a large number of Axolotls (*Siredon*). In one tank are the two celebrated specimens of this most abnormal of creatures which have got rid of their external gills and converted themselves into the Salamandroid form, *Ambystoma*. In one of the end compartments are the venomous snakes; in the other, Lacertilia of various kinds.

The cages for the Snakes are fitted up with moss, earth,